UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

Memorandum

To: Mike Ribordy, Section Chief, Response Section 3, ERB2

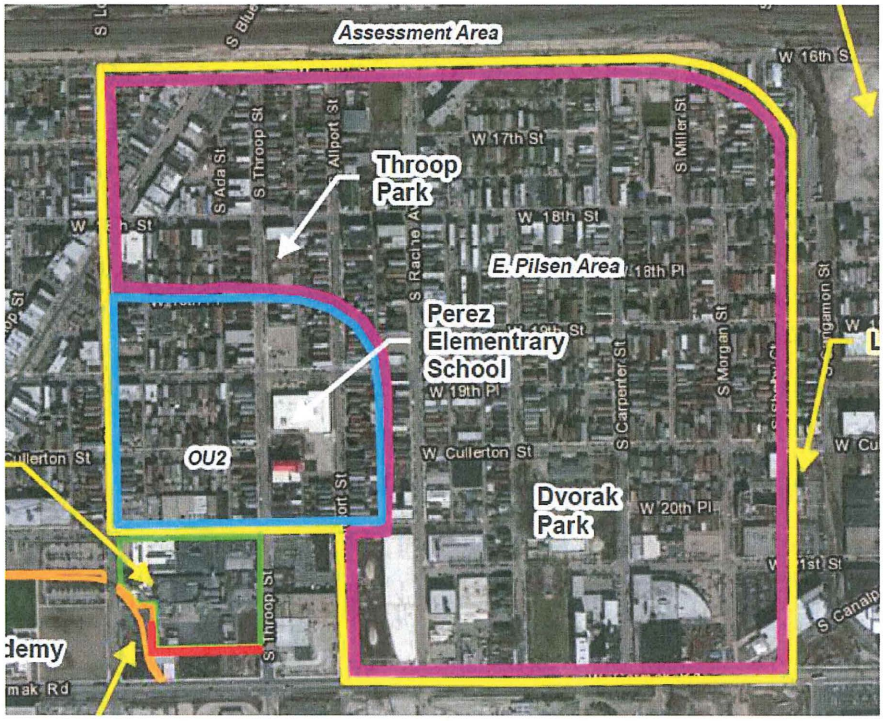
From: Ramon Mendoza, On-Scene Coordinator, Response Section 3, ERB2

Date: July 8, 2015

Subject: Definition of Operable Unit 2 (OU2) Boundary [for the Pilsen Soil Operable Unit 2 Residential Site (C5N8_02)]

The attached Memorandum documents the work conducted with EPA FIELDS (John Canar) to develop the boundary for Operable Unit 2, which is a residential area where surface soil contaminated (in yards including gardens) with lead may be attributable to H.Kramer, a brass and bronze foundry (H.Kramer) located at 1345 West 21st Street Chicago, Illinois.

EPA Reports such as the 1) WESTON Solutions Removal Site Evaluation Report for Pilsen Soil Assessment Area Residential Revision 2 (Nov.2014) and 2) EPA NEIC Technical Report Additional Characterization of Lead in Soils Pilsen Neighborhood, Chicago, IL (March,2015) had referred to the "Res 1 and Res 2" as the areas which may be attributable to H. Kramer. This Memo evaluated the data to develop Res2a as the area in Res 2 which is attributable to H. Kramer. OU2 is the area composed of Res 1 and Res2a (See figure below).



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

Memorandum

To: Robert Peachey, Associate Regional Counsel, C-14J

From : Ramon Mendoza, On-Scene Coordinator, SE-5J
John Canar, Environmental Scientist, FIELDS Group, SRF-5J

Date: May 28, 2015

Subject: Definition of Res2a Area Within Res 2

Introduction:

From May to August 2013, soil samples were collected by the USEPA and its contractor, Weston Solutions, near the H. Kramer property as well as at locations up to a mile and a half away from the property. These samples were analyzed for metals by an accredited laboratory.

The metals focused on for this study were Copper, Lead, and Zinc because these metals are more indicative of the metals present in H. Kramer's airborne emissions (see Figure 1), as well as the facility's Toxic Release Inventory (TRI) data.

Background: A more extensive statistical analysis of these metals, as well as Cadmium and Tin, was presented in the USEPA's residential report dated 27 October 2014. That report concluded that, based on the statistical analysis of Cadmium, Copper, Lead, Tin, and Zinc (found at and near the H. Kramer facility), H. Kramer is a significant contributor for elevated lead in residential surface soil in the RR/Alley, Res 1 and Res 2.

However, there is uncertainty as to H. Kramer's contribution of lead in residential areas in Res2 as one travels closer to Res2's outer boundary in the predominant downwind direction from H. Kramer. For example, some homes sampled in Res2 were below 400 mg/kg, which is the residential removal level for lead, and which is comparable to local reference areas which were assumed not to have been impacted by H. Kramer's emissions.

Purpose: The purpose of these analyses was to investigate the similarities and differences in concentrations of Copper, Lead, and Zinc in soils on and near the H. Kramer property and the nearby Pilsen residential neighborhood. Specifically, the study developed an area called Res2a, a subset of the larger Res2 area.

Methods:

Data sets

The USEPA-Weston-TetraTech samples consisted of grab and composites containing soil from up to five discrete locations on a given property. Soil samples were collected from the following depths: 0-6, 0-12, 6-12, 6-18, 6-24, and 18-24 inches below ground surface (bgs). The samples from the 0-6 inches bgs interval were used in these analyses. Samples were taken in front and back yards, alleys, and in soil areas with railroad tracks. The samples taken in gardens and drip zones were not used in this analysis due to garden soils potentially being amended, mixed and often imported, and drip zones being likely to contain lead from Lead-based paint. Additionally, replicate samples and duplicate samples were not used in this analysis.

The samples were separated into eight areas called Railroad, Alley, Res1, Res2a, Res2, Res3, Little Italy, and West (see Figure 2). Little Italy is considered the local reference area. Little Italy was selected as it was mostly crosswind/upwind from the H. Kramer smelter and, compared to the Pilsen-Kramer area, had a more limited industrial past, and was similar in terms of age. Figure 3 is a representation of the historic wind directions for the Pilsen-Kramer area and environs. Note that "arms" in the figure represent the direction to which the wind blows; and the numbers represent the proportion of the time the wind goes in each direction. Hence, for this wind rose, the predominant winds are from the west and the south. The Res1, Res2a, Res2, and Res3 areas were created based on the spatial grouping of the USEPA's residential soil sampling locations and the prevalent wind directions (from 1928 to 2013). These four areas are presented in Figure 4, which also shows the Lead levels in the top six inches. (The West area, i.e., near Harrison Park/Heart of Chicago (see Figure 2) is also a potential local reference area, although it may have been impacted by historic heavy-metal emitters that were located in that area.)

In addition, surface soil samples taken on-site at H. Kramer's facility and documented in a 2006 report were used (CRA, 2006).

Mapping

Copper, Lead, and Zinc levels in the top six inches collected in the Alley, Railroad (RR), H.Kramer (on-site), Harrison Park, Little Italy, and the four residential areas (Res1, Res2a, Res2, and Res3) were mapped (Figures 4, 5, 6, 11, 12, & 13). Additionally, ratios of Copper to Lead and Zinc to Lead were also mapped (Figures 7, 8, 9, & 10). These maps were distinguished by Lead levels. Hence, Copper to Lead ratios were mapped for those samples with Lead levels less than 400ppm (U.S. EPA's Removal Management Level [RML] for residential soil, hazard quotient [HQ] 3); and also mapped for samples with Lead levels greater than or equal to 400ppm.

The ratio maps were developed using the average ratio of Copper to Lead and Zinc to Lead found in Little Italy, the local reference area.

Results and Conclusions:

As stated in the 27 October 2014 USEPA Fields Group report (Statistical Report) the initial residential soil sample groupings were determined based on the spatial grouping of the USEPA's residential soil sampling locations and the prevalent wind directions (from 1928 to 2013). In addition, these groupings ensured that adequate sample numbers were available for each residential area.

The final spatial groupings were determined using multiple lines of evidence: SEM/EDS (scanning electron microscopy with energy dispersive X-ray spectrometry), metal ratios indicative of the site data (Zn/Pb and Cu/Pb), and finally, statistical multiple comparison procedures (MCPs).

Copper, Lead, and Zinc levels in the top six inches collected in the Alley, Railroad (RR), Harrison Park, Little Italy, and the four residential areas (Res1, Res2a, Res2, and Res3) are shown in Figures 5, 4, and 6, respectively. The figures demonstrate a gradient of high to low metal levels as one travels farther away from the Alley and Railroad areas, i.e., the H. Kramer property. (The elevated Lead levels in the Harrison Park area are believed to be from a different source or sources, independent of H. Kramer.)

Figures 7 and 8 contrast the differences in Copper to Lead and Zinc to Lead ratios, respectively, between the Alley, Railroad, Res1, and Res2a compared to Res2, Res3, Harrison Park, and Little Italy. Additionally, there is a greater incidence of Lead values at or above 400ppm in the Alley, Railroad, Res1, and Res2a compared to Res2, Res3, and Little Italy. (Again, the elevated Lead levels in the Harrison Park area are believed to be from a different source or sources, independent of H. Kramer.)

The soil SEM/EDS results from the Railroad, Alley, Res 1 and Res 2a areas consistently showed lead bearing particles with zinc greater than lead.

Based on the aforementioned comparison figures, specifically the ratios of Copper to Lead and Zinc to Lead, and SEM/EDS results, the extent of the areas where H. Kramer may be a significant contributor (with reduced uncertainty) to surface soil lead contamination can be clearly shown within the boundaries (*) of the following areas: Railroad Spur, Alley, Res1 and Res2a

(*Note: The areas in the predominant downwind direction of the outer boundary line [orange] of Res2a is the approximate line where the probability of H. Kramer, as a significant contributor of lead contamination in surface soil, is more difficult to support based on the information available.)

References:

Conestoga Rovers & Associates. November 2006. Revised Focused Site Investigation Report H. Kramer Chicago, Illinois.

Weston Solutions Inc.. April 2014. Site Assessment Report for Pilsen Soil Assessment Area Railroad/Alley. Chicago Cook County, Illinois.

Weston Solutions Inc. Nov. 2014. Site Assessment Report for Pilsen Soil Assessment AArea Railroad/Alley. Chicago Cook County, Illinois Addendum 1.

Weston Solutions Inc. Nov. 2014. Removal Site Evaluation for Pilsen Soil Assessment Area Residential. Chicago Cook County Illinois.

EPA. National Enforcement Investigations Center, Machemer, Hosick, Pribil. February 2015. NEICVP1060E02 Technical Report Characterization of Lead in Soils Pilsen Neighborhood Chicago, Illinois.

EPA, Mendoza. May 2015. Pilsen Soils OU1 Railroad Spur and Alley Site: Western Area , Railroad Spur Soil Sample Results.

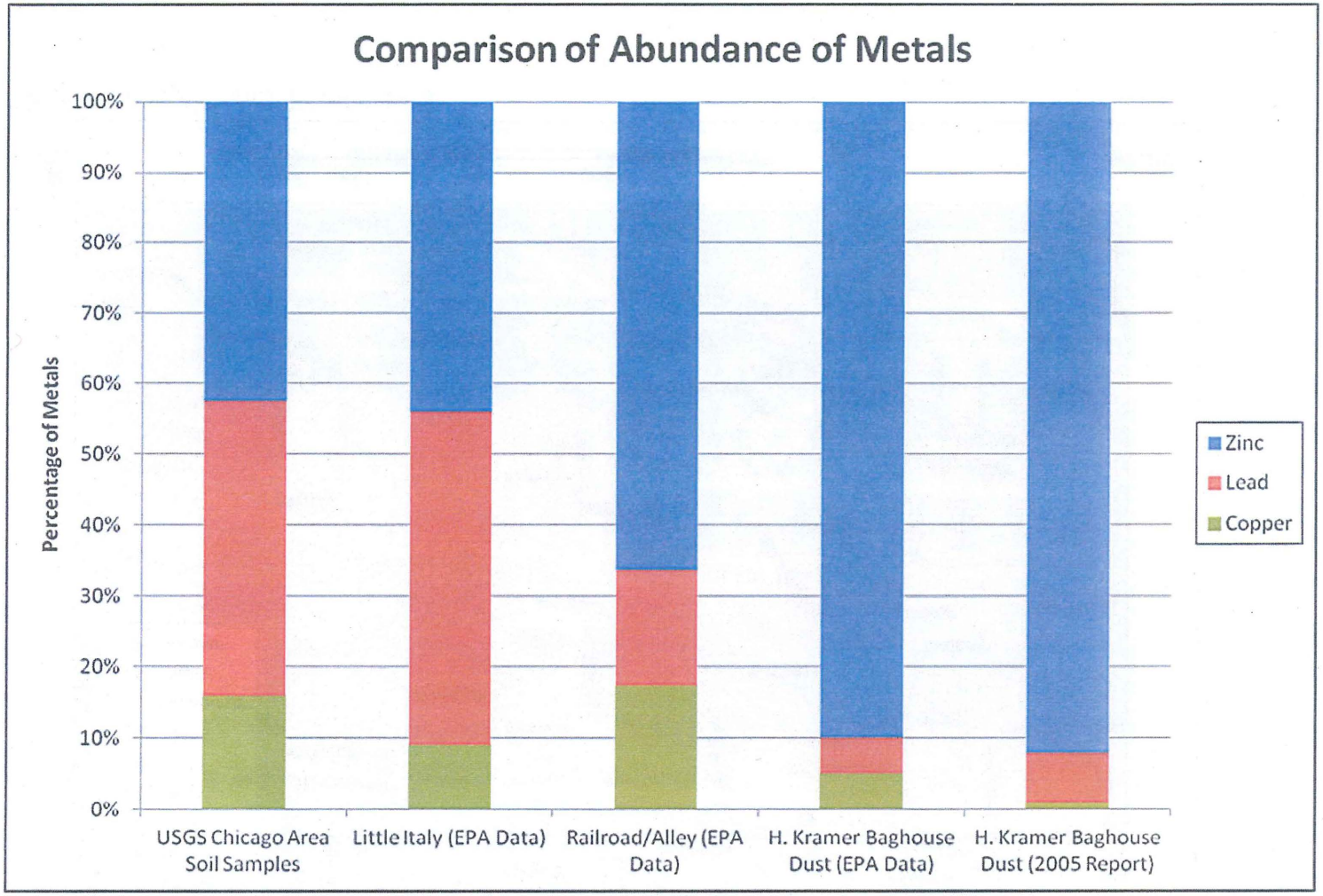


Figure 1: Comparison of Abundance of Metals for Copper, Zinc, and Lead.

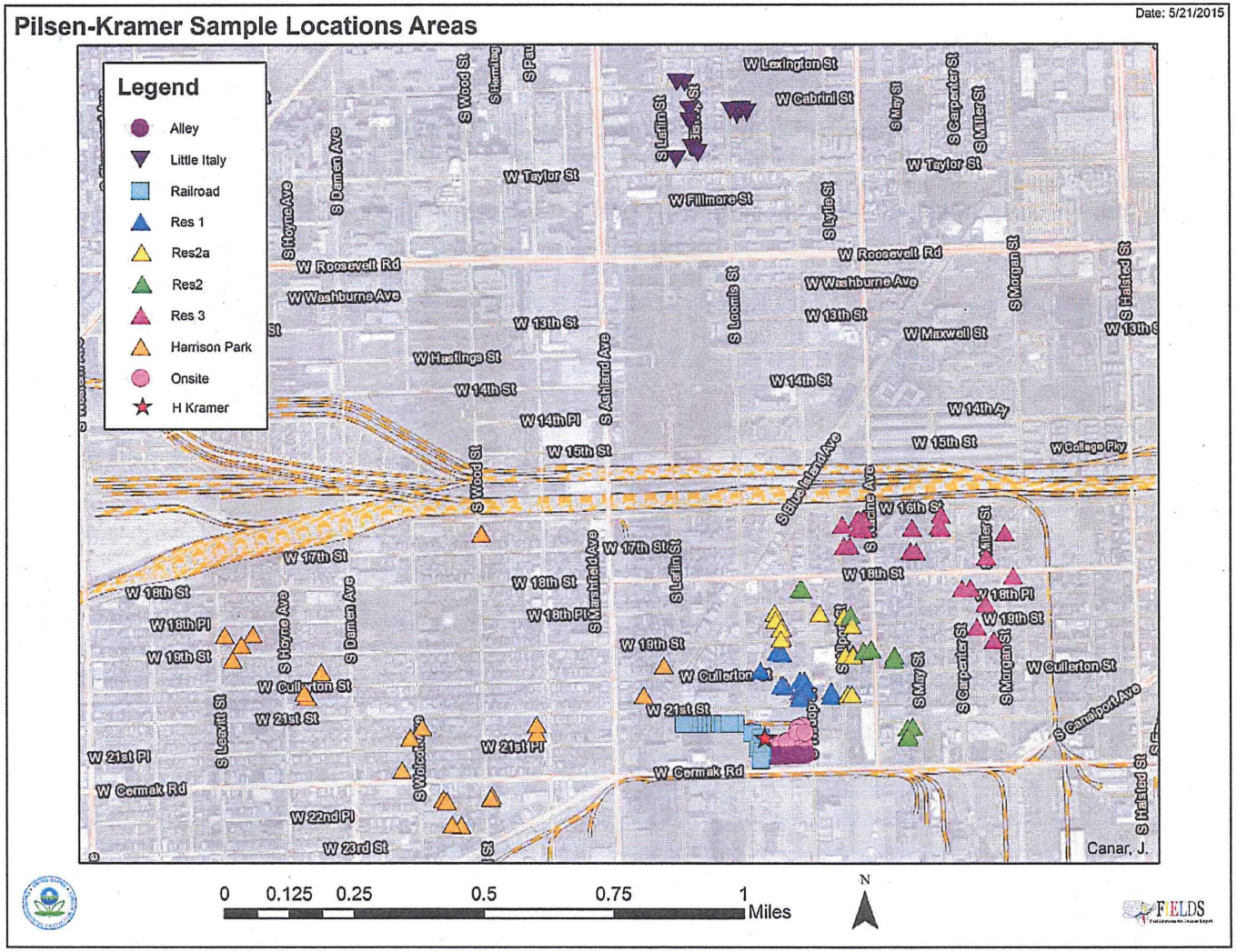


Figure 2: Sample locations and areas

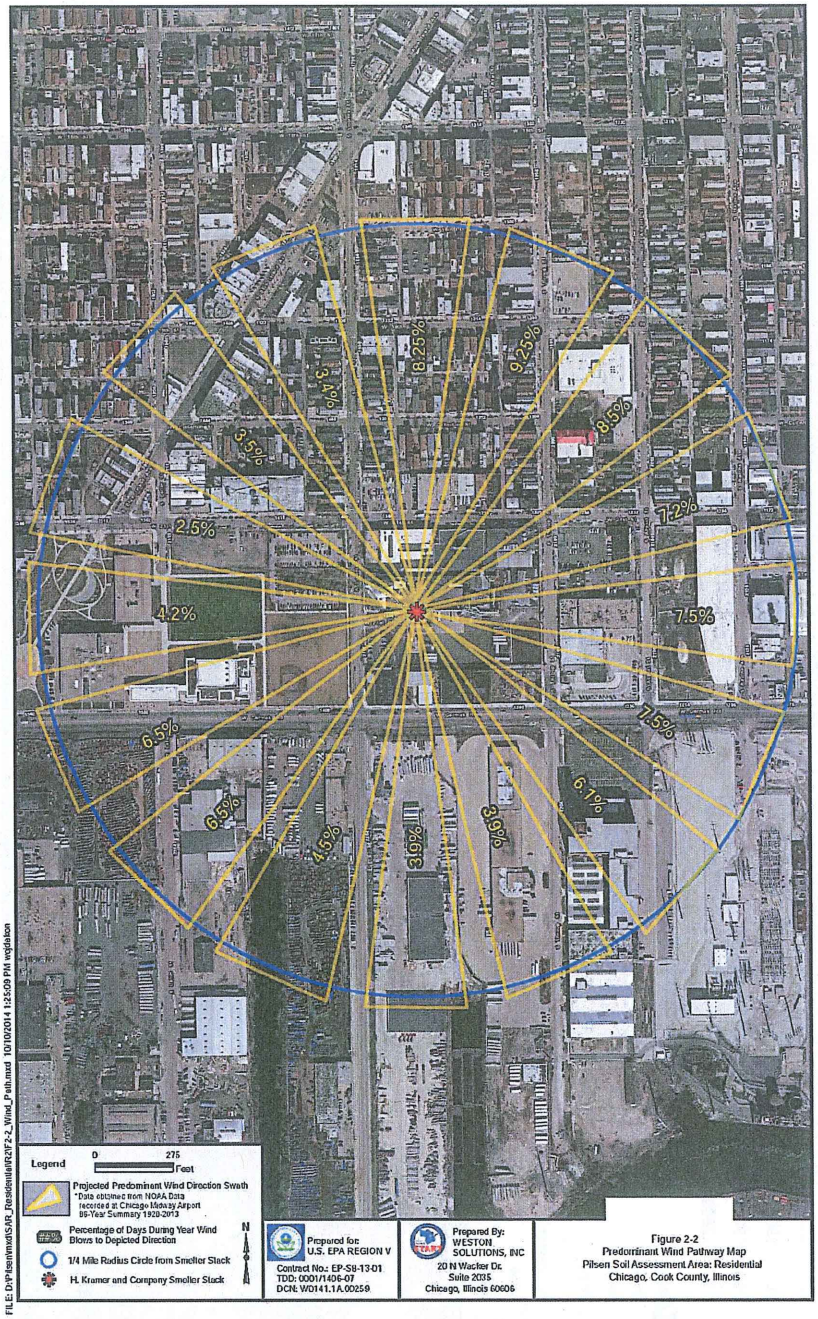


Figure 3: Predominant wind pathway map the Pilsen-Kramer area and environs. Note that "arms" in the figure represent the direction to which the wind blows; and the numbers represent the proportion of the time the wind goes in each direction.

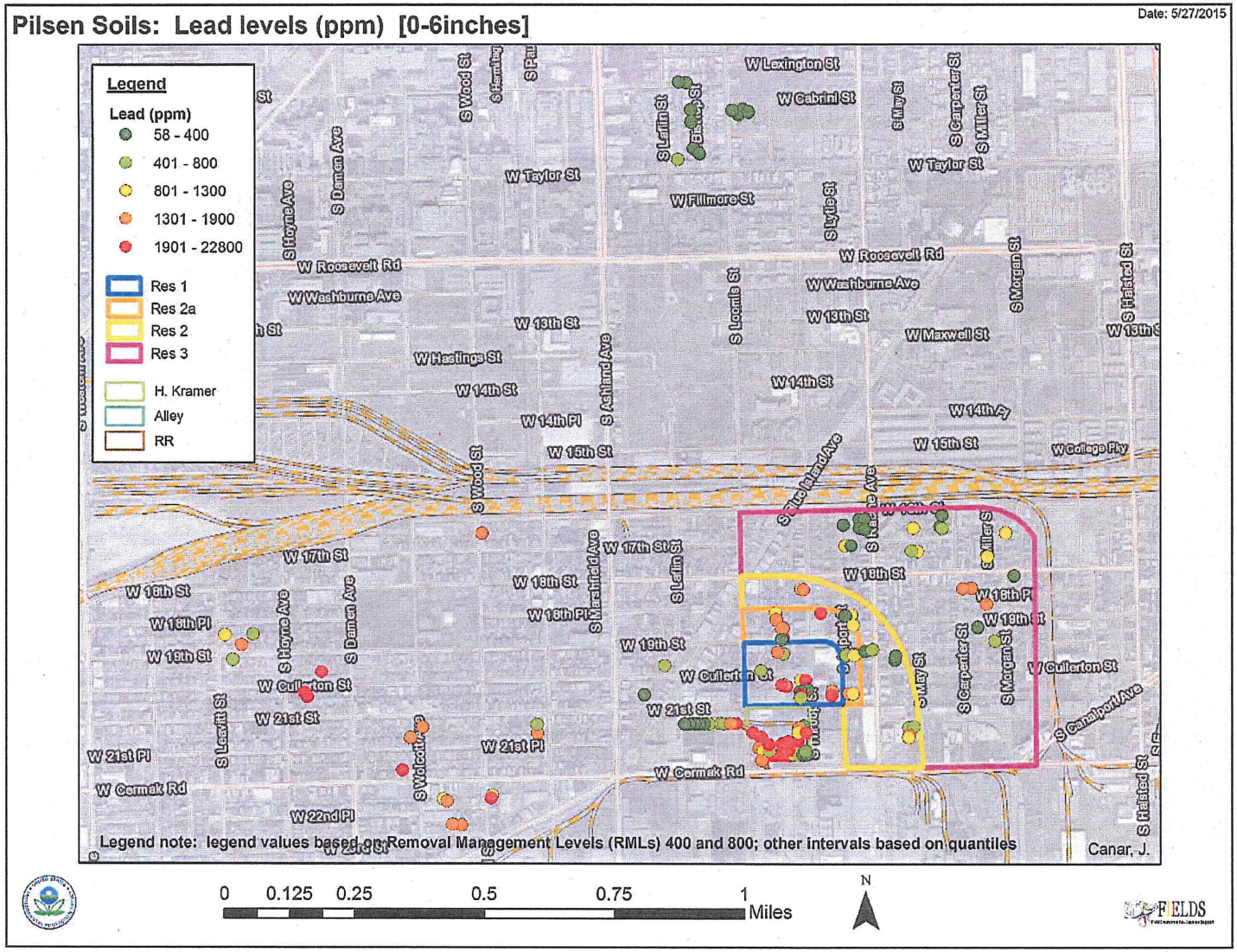


Figure 4: Lead levels (ppm) in the Alley, Railroad, H.Kramer on-site, Harrison Park, Little Italy, and near residential areas: Res1, Res2a, Res2, and Res3.

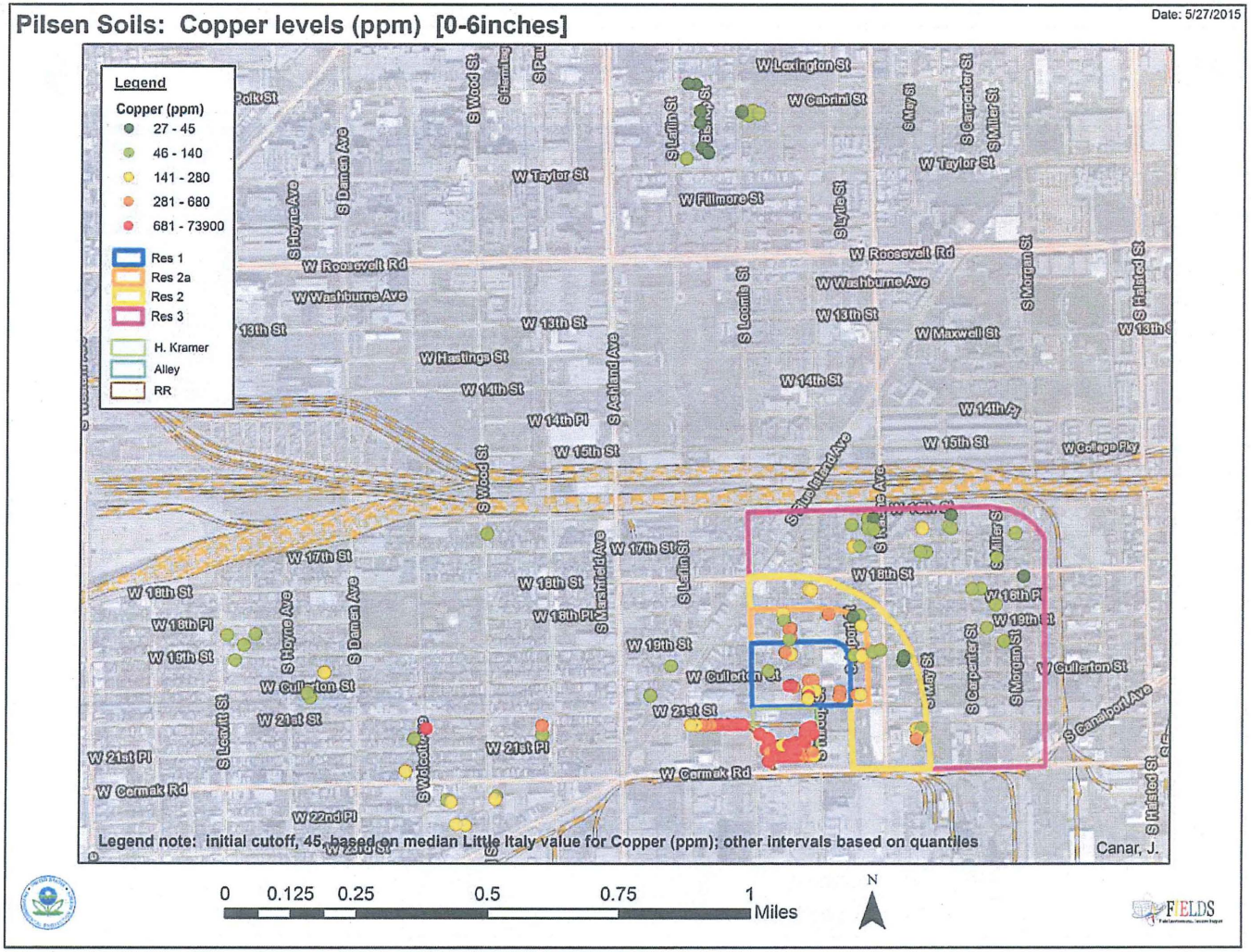


Figure 5: Copper levels (ppm) in the Alley, Railroad, H.Kramer on-site, Harrison Park, Little Italy, and near residential areas: Res1, Res2a, Res2, and Res3.

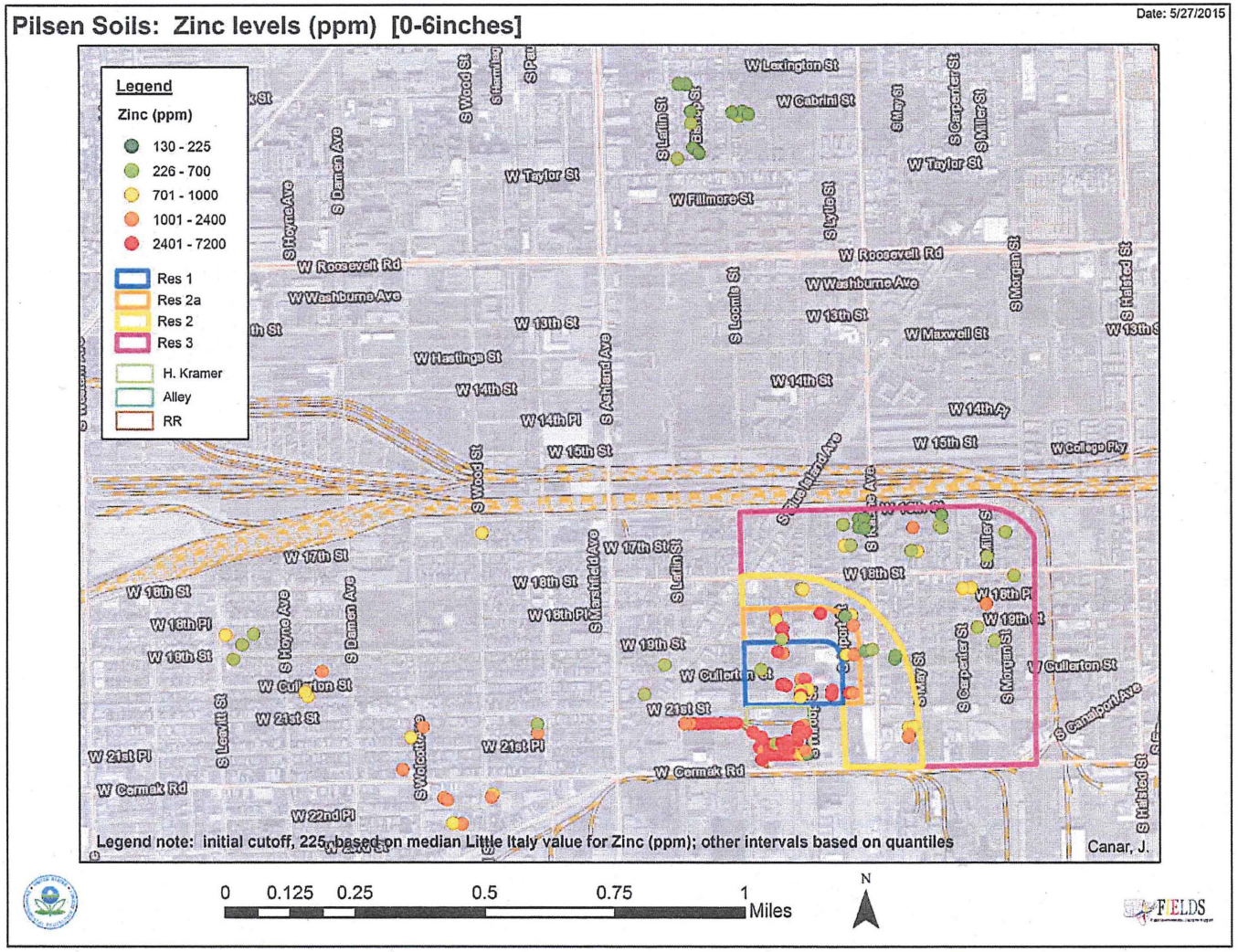


Figure 6: Zinc levels (ppm) in the Alley, Railroad, H.Kramer on-site, Harrison Park, Little Italy, and near residential areas: Res1, Res2a, Res2, and Res3.

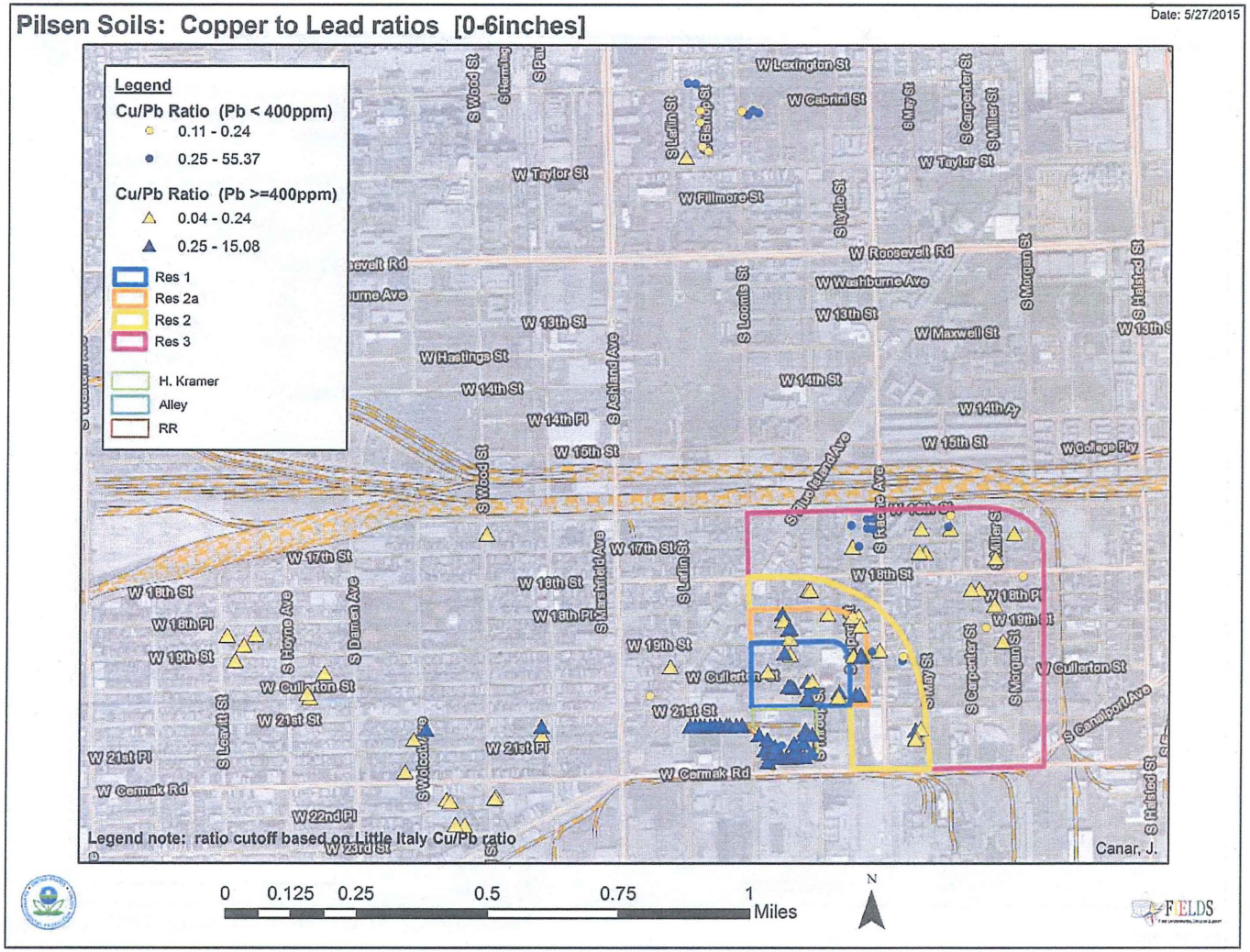


Figure 7: Copper to Lead ratio in the Alley, Railroad, H.Kramer on-site, Harrison Park, Little Italy, and near residential areas: Res1, Res2a, Res2, and Res3.

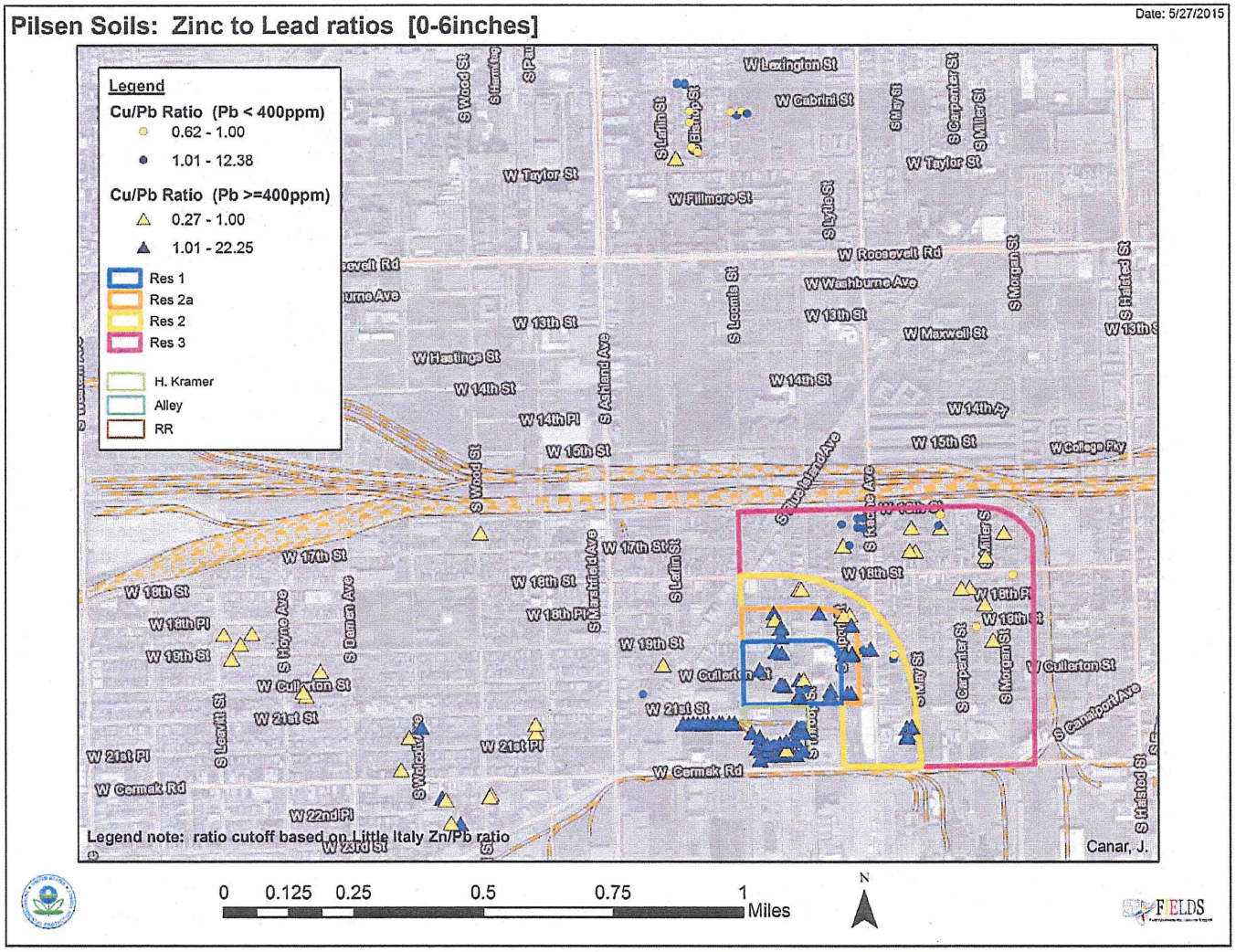


Figure 8: Zinc to Lead ratio in the Alley, Railroad, H.Kramer on-site, Harrison Park, Little Italy, and near residential areas: Res1, Res2a, Res2, and Res3.

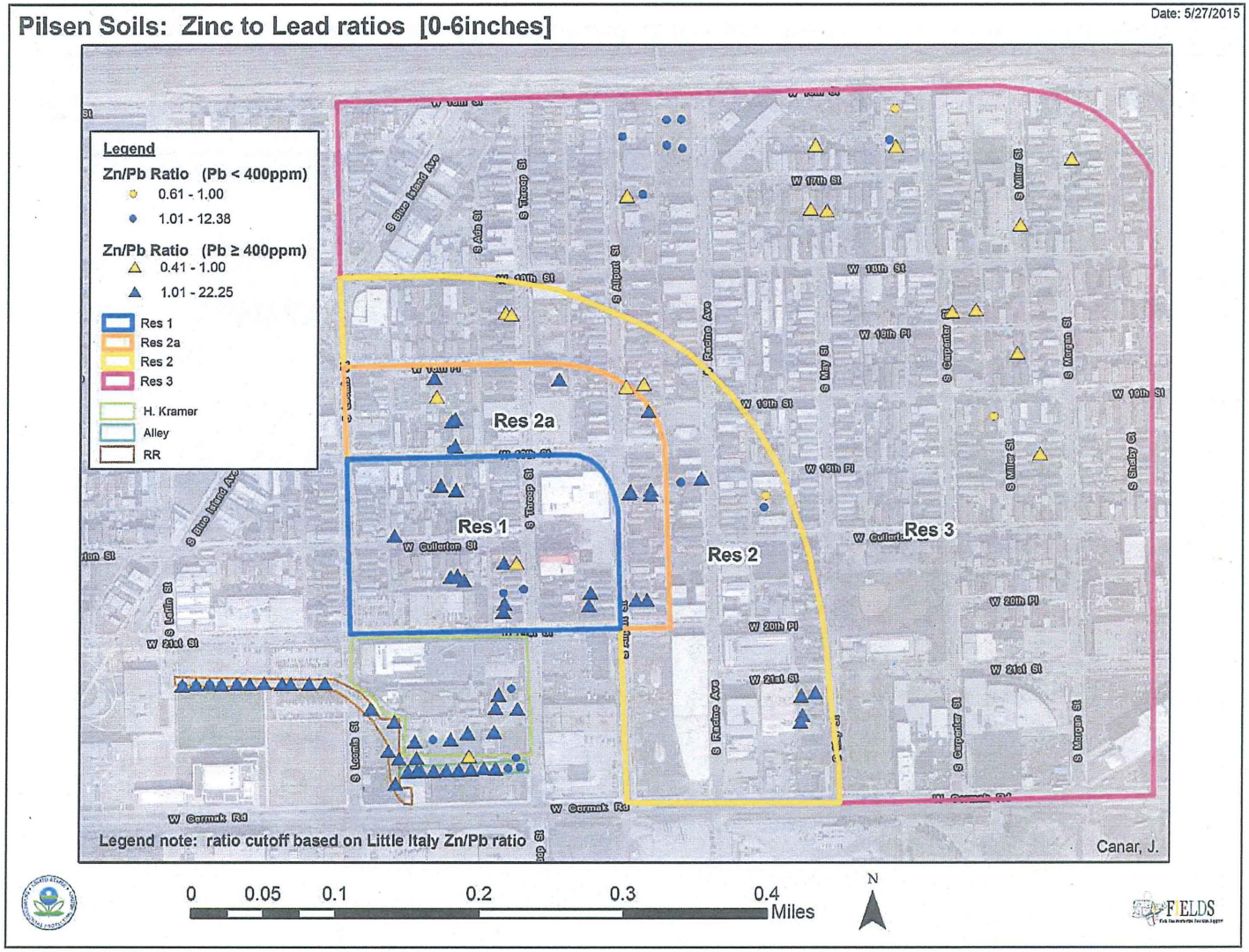


Figure 9: Zinc to Lead ratio in the Alley, Railroad, H.Kramer on-site, and near residential areas: Res1, Res2a, Res2, and Res3.

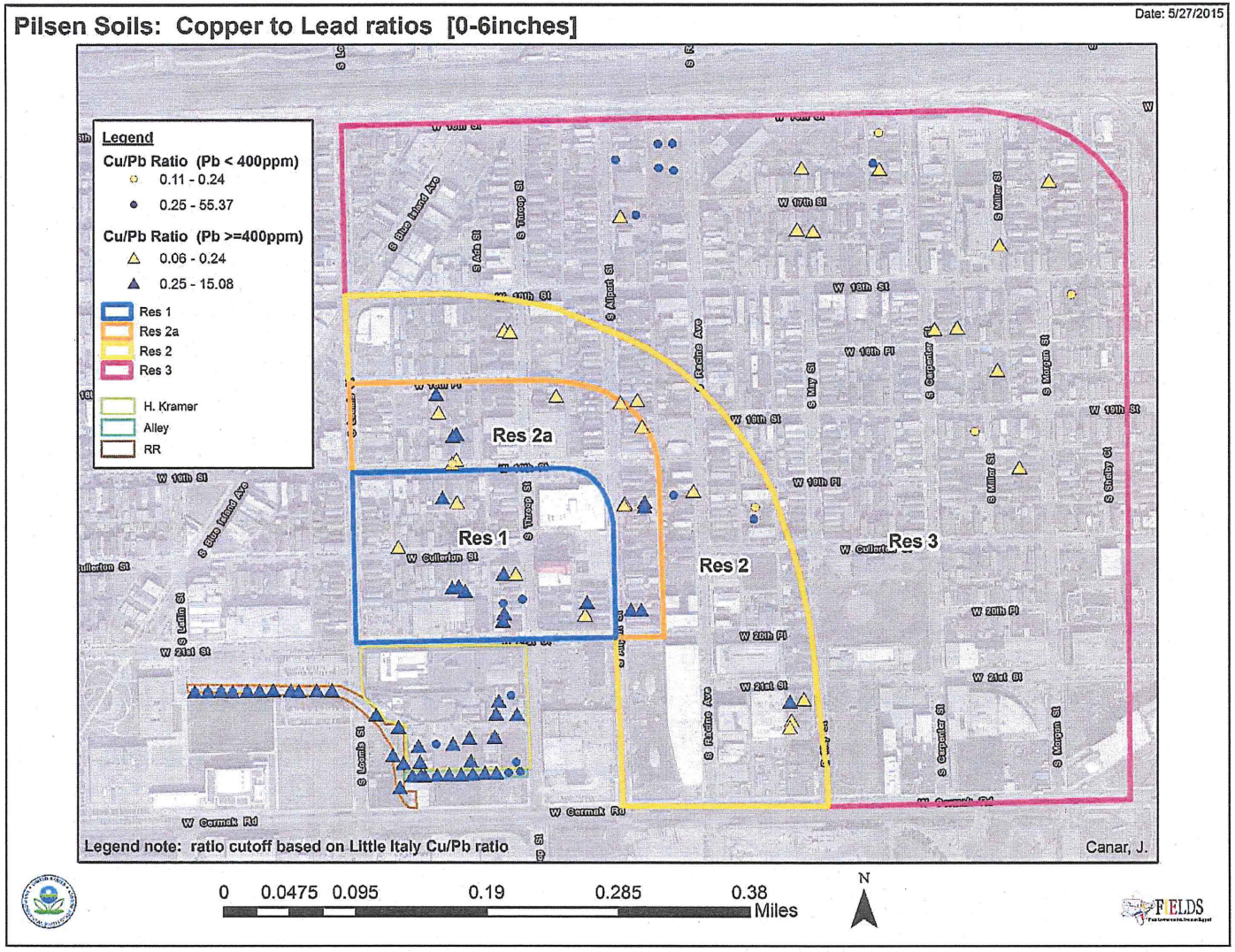


Figure 10: Copper to Lead ratio in the Alley, Railroad, H.Kramer on-site, and near residential areas: Res1, Res2a, Res2, and Res3.

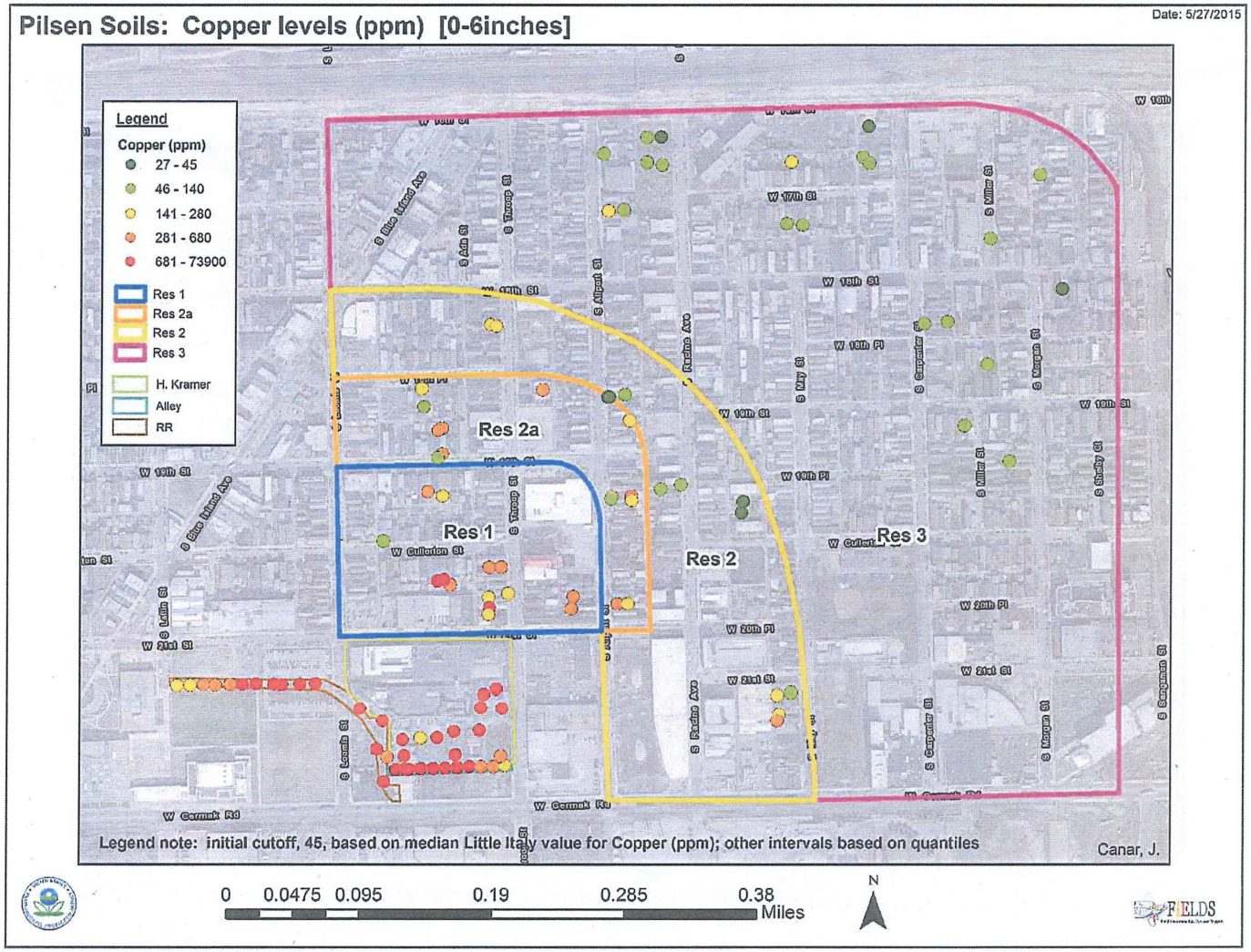


Figure 11: Copper Levels in the Alley, Railroad, H.Kramer on-site, and near residential areas: Res1, Res2a, Res2, and Res3.

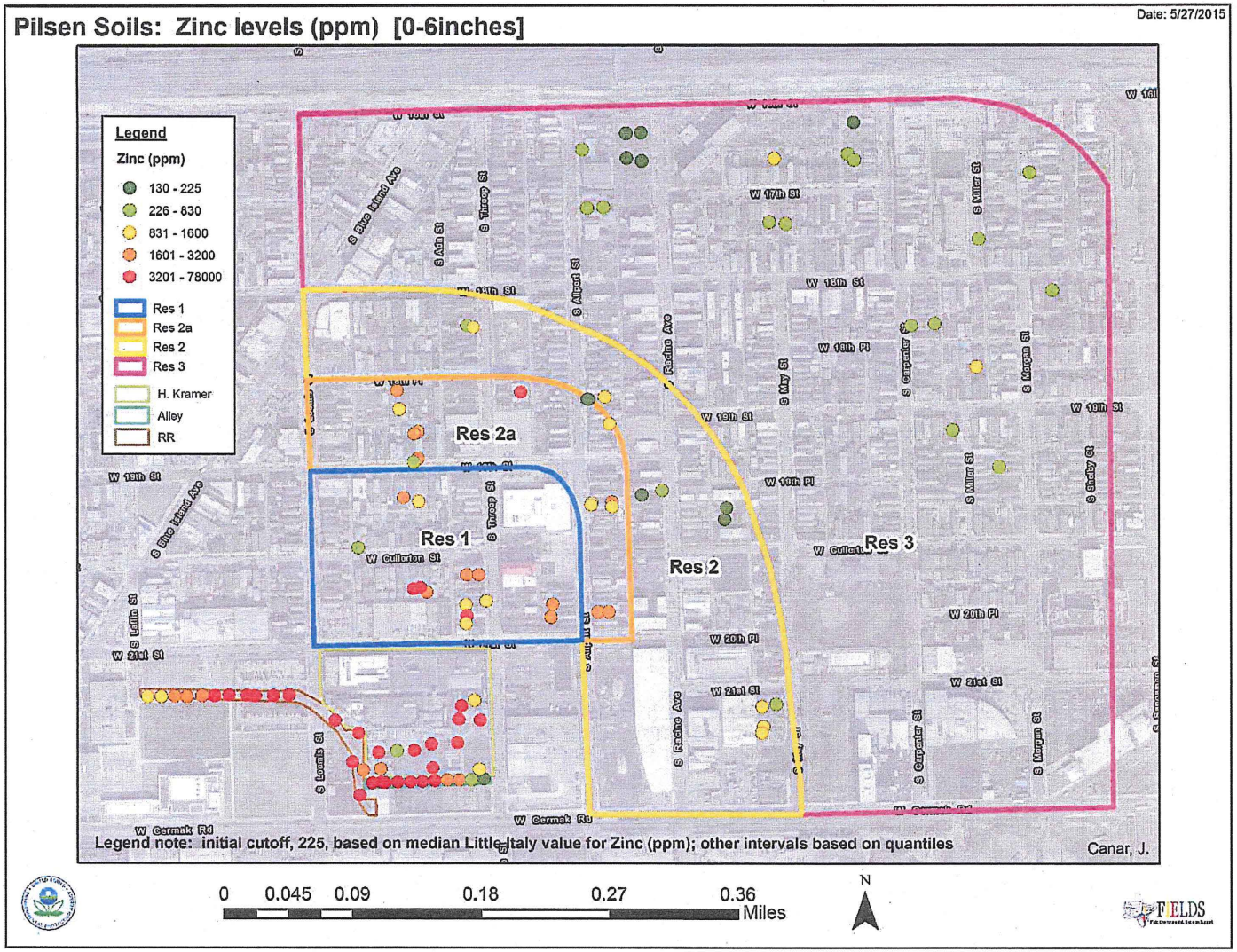


Figure 12: Zinc Levels in the Alley, Railroad, H.Kramer on-site, and near residential areas: Res1, Res2a, Res2, and Res3.

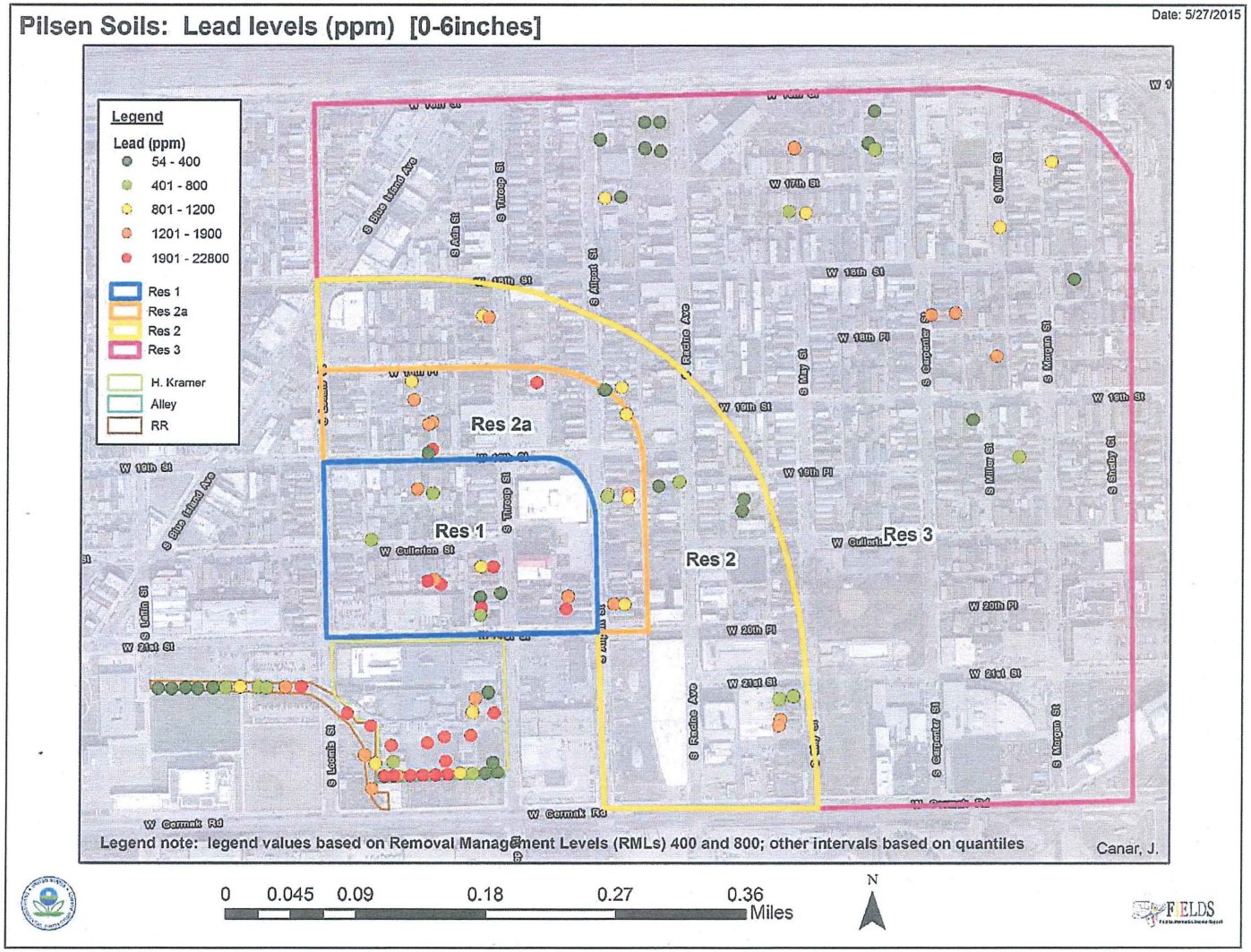


Figure 13: Lead Levels in the Alley, Railroad, H.Kramer on-site, and near residential areas: Res1, Res2a, Res2, and Res3.